इंटरनेट मानक

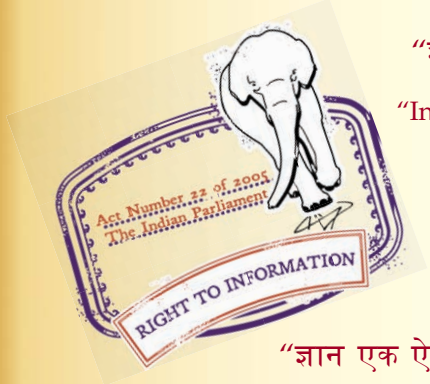
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 11930 (1986): Methods of thermal shock test for glass containers [CHD 10: Glassware]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

UDC 666·171 : 621·798·147 : 620·193·5

(Reaffirmed 1998)

Indian Standard

METHODS OF THERMAL SHOCK TESTS FOR GLASS CONTAINERS

1. Scope — Specifies methods of test for determining the thermal shock resistance and thermal shock endurance of glass containers made from soda-lime-silica glass.

1.1 This standard does not apply to glass containers not made from soda-lime-silica glass and laboratory glassware which are not containers.

2. Definitions

2.1 *Soda-Lime-Silica-Glass* — Glass in which the major constituents, silica, soda and lime, form about 96 percent of the composition.

2.2 *Container* — A general term applied to glass bottles and jars.

2.3 *Thermal Shock* — A sudden change in temperature applied to containers.

2.4 *Thermal Shock Resistance* — The actual temperature change, or thermal shock, measured in degrees celsius, which a container can withstand without breaking.

2.5 *Thermal Shock Endurance* — An interpolated thermal shock resistance value at which 50 percent of the containers will probably fail.

3. Apparatus

3.1 *Cold Water Bath* — The cold water bath shall comprise of a bath or tank capable of containing at least 8 litres of water for each kilogram of glass tested at one time. It shall be fitted with a water circulator, a thermometer and a thermostatic control capable of maintaining the water temperature to within $\pm$ 1°C of a specified lower temperature, t_2 within the range of 22 $\pm$5°C (*see* Note under **6.3**).

3.2 *Hot Water Bath* — The hot water bath shall comprise of a bath or tank capable of containing at least 8 litres of water for each kilogram of glass being tested at one time. It shall be fitted with a water circulator, a thermometer and a thermostatically controlled heater capable of maintaining the water temperature to within $\pm$ 1°C of a specified upper temperature, t_1.

3.3 *Basket* — The basket shall be made out of or coated with an inert material which will not scratch or scuff the containers. The basket shall be capable of holding the containers upright and separate, and shall be fitted with a perforated lid to prevent the containers, it may be combined with an automatic device for immersing the basket of containers in the hot bath (*see* **3.2**) and transferring it to the cold bath (*see* **3.1**).

4. Sampling

4.1 The test shall be performed on a predetermined number of containers.

4.2 The containers used for the test shall not have been subjected to any other mechanical or thermal test procedure which could adversely affect their thermal shock resistance.

4.3 The samples shall be selected to provide the information which is required from the particular test.

5. Procedure

5.1 Allow the containers to reach ambient temperature and, throughout the test, the apparatus shall be protected from draughts.

Glass Containers Sectional Committee, MCPD 13 [Ref : Doc : MCPD 13 (699)]

Adopted 26 November 1986

Gr 2

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

5.2 Fill the cold bath (*see* **3.1**) with water to a volume equal to at least 8 litres for each kilogram of glass to be tested and to a depth sufficient for complete immersion of the containers plus at least 50 mm. Adjust the water temperature to within $\pm$ 1°C of the specified lower temperature, t_2.

5.3 Fill the hot bath (*see* **3.2**) with at least the same volume of water as in **5.2**, then heat and maintain the temperature to within $\pm$ 1°C of the specified upper temperature, t_1.

5.4 Place the empty containers in the basket (*see* **5.3**) so that they are held upright and separate, then fasten the lid and immerse the basket in the hot bath, until the containers are completely filled with water and the tops of their finishes are at least 50 mm below the water level, if necessary, adjust the heat control to maintain the bath temperature to within $\pm$1°C of the specified upper temperature t_1, and keep the containers immersed at this temperature for 5 minutes.

5.5 Transfer the basket with the filled containers, either mechanically or manually, within 15 $\pm$1 s, from the hot bath to the cold bath so that the containers are completely immersed. Keep the containers immersed for 30 s, then remove the basket and its contents from the cold bath.

5.6 Determine as soon as possible the number of containers which have failed the test, by inspecting each one for cracks or breakage.

6. Thermal Shock Resistance

6.1 *Pass Test* — A sample shall be deemed to have passed the test if no more than the agreed number are cracked or broken, after being subjected to an agreed thermal shock of ($t_1 - t_2$).

6.2 *Progressive Test to a Specified Percentage of Breakages* — Containers which pass the test shall be repeatedly tested, as described in **5**, but with increasing ($t_1 - t_2$) values, until a specified percentage of the containers fail the test.

Note — Normally the difference between t_2 and t_1 is increased in 5°C increments.

6.3 *Total Progressive Test* — Containers which pass the test, described in **5**, shall be tested in accordance with **6.2**, until all the containers fail the test.

Note — If the test has not been concluded by the time the temperature of the hot water reaches 95°C, the test should be continued by lowering the temperature of the cold water bath.

6.4 *High-Level Test* — Containers shall be tested in accordance with **5**, but at a temperature difference ($t_1 - t_2$), sufficiently high to cause an agreed percentage to fail in a single test.

7. Thermal Shock Endurance

7.1 The containers shall be tested in accordance with the total progressive test, described in **6.3** and the number of failure at each temperature difference shall be recorded.

7.2 The thermal endurance, which is the probable temperature difference at which 50 percent of the containers would have failed, is determined from a graph of the cumulative percentage of failures against the temperature difference at which the containers failed.

8. Test Report — The test report shall include the following :

a) the reference of this standard;

b) the number of containers in the sample tested and sampling method;

c) the temperature of the cold bath; and

d) the test results;

1) for the pass test, in accordance with **6.1**:
   i) the temperature difference ($t_1 - t_2$),
   ii) the number of containers which failed the test, and
   iii) the specification limit and whether the samples passed the test;

2) for the progressive test, in accordance with **6.2** :
   i) the highest temperature difference ($t_1 - t_2$), at which no failure occurred;
   ii) the number of containers which failed at each temperature difference, and
   iii) the temperature difference needed to achieve the pre-determined percentage of failures, expressed to the nearest increment stop;

3) for the total progressive test, in accordance with **6.3**:
   i) the temperature difference used in the test;
   ii) the number of containers which failed at each temperature difference; and
   iii) the mean temperature difference of the failure;

4) for the high-level test, in accordance with **6.4**:
   i) the temperature difference used in the test, and
   ii) the percentage of containers which failed at that temperature difference;

5) for the thermal shock endurance test, in accordance with **7**:
   i) the temperature difference at which 50 percent of the sample would have failed.

EXPLANATORY NOTE

This standard lays down the thermal shock resistance and thermal shock tests for glass containers made from soda-lime-silica glass. This standard does not apply to glass containers not made from soda-lime-silica glass. Also this standard is not applicable to laboratory glassware which are not containers. A separate standard IS : 6506-1972 'Methods for thermal shock tests on glassware' is available for glassware.

While preparing this standard assistance has been derived from ISO 7459-1984(E) 'Glass containers — Thermal shock resistance and thermal shock endurance — Test methods', issued by the International Organization for Standardization (ISO).

Printed at Swatantra Bharat Press, Delhi, India